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Kawai

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(54) **IMAGE FORMING APPARATUS AND METHOD FOR DISPLAYING APPLICATION SCREEN OF IMAGE FORMING APPARATUS THAT ENSURES DISPLAY OF APPLICATION SCREEN ON OPERATION PANEL WITH DIFFERENT RESOLUTION**

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H04N 1/00	(2006.01)
G06F 3/12	(2006.01)

(52) **U.S. Cl.**

CPC ***H04N 1/00941*** (2013.01); ***H04N 1/0097*** (2013.01); ***H04N 1/00405*** (2013.01); *H04N 2201/0094* (2013.01)

(58) **Field of Classification Search**

None

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

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(57) **ABSTRACT**

An image forming apparatus into which applications are installable includes an operation panel and a resolution comparing circuit. The operation panel has a display resolution. The resolution comparing circuit compares the display resolution with resolution of an application screen that an installed application displays. If the resolution comparing circuit determines that the display resolution is higher than the application screen resolution, the image forming apparatus displays the application screen as a screen provided with a frame.

6 Claims, 4 Drawing Sheets

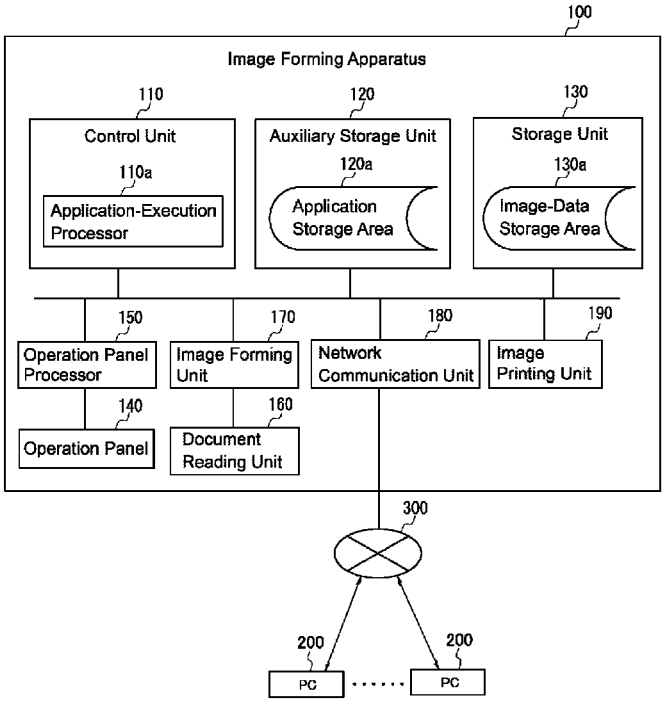

FIG. 1

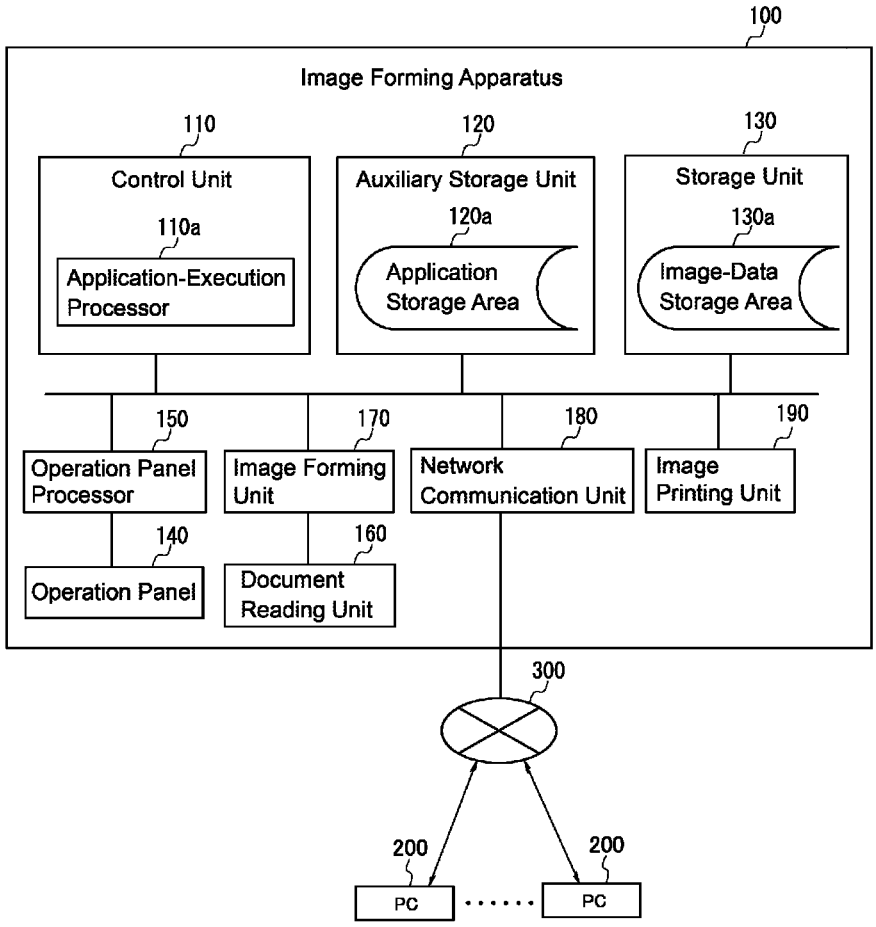
100
Image Forming Apparatus
110
Control Unit
110a
Application-Execution Processor
120
Auxiliary Storage Unit
120a
Application Storage Area
130
Storage Unit
130a
Image-Data Storage Area
150
Operation Panel Processor
170
Image Forming Unit
180
Network Communication Unit
190
Image Printing Unit
140
Operation Panel
160
Document Reading Unit
300
200
PC
200
PC

FIG. 2

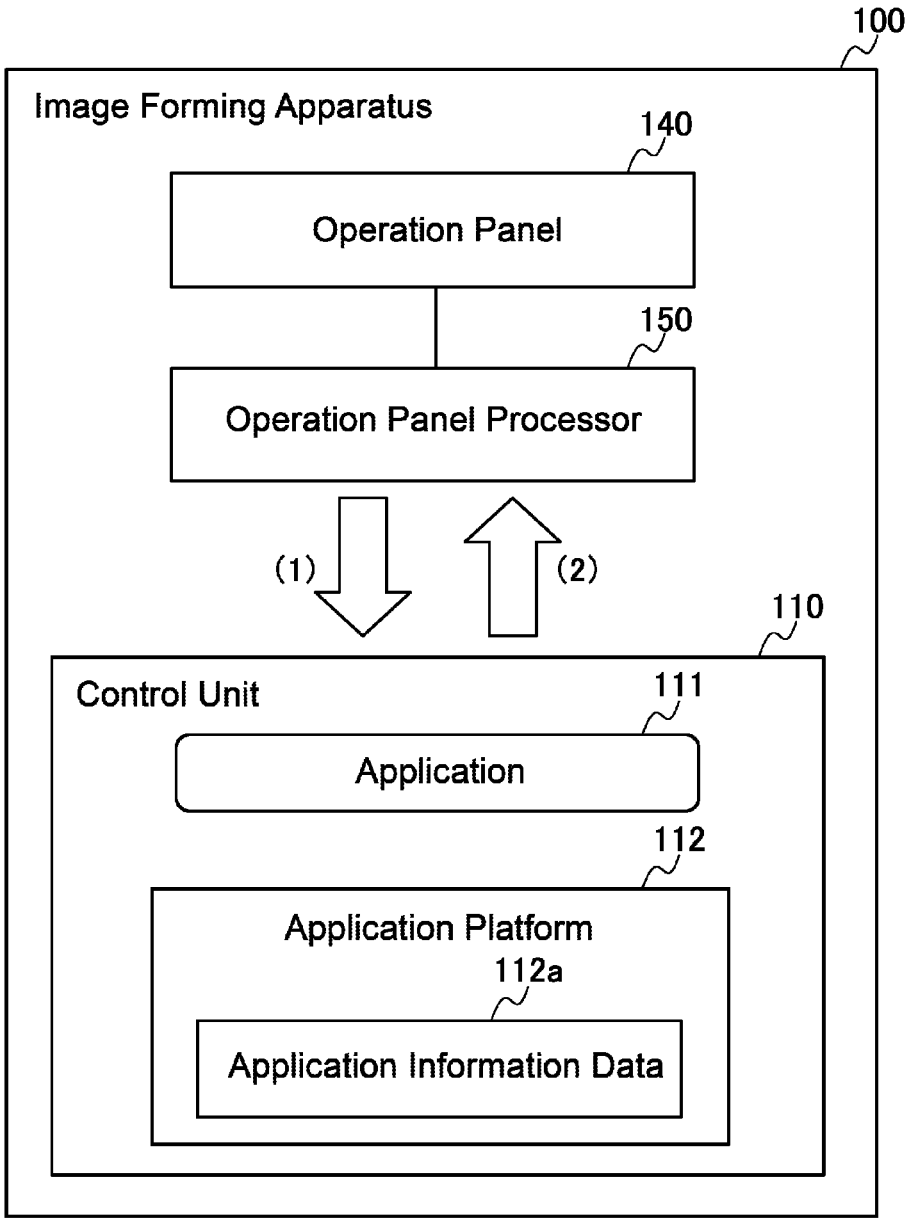
100
Image Forming Apparatus
140
Operation Panel
150
Operation Panel Processor
(1)
(2)
110
Control Unit
111
Application
112
Application Platform
112a
Application Information Data

FIG. 3

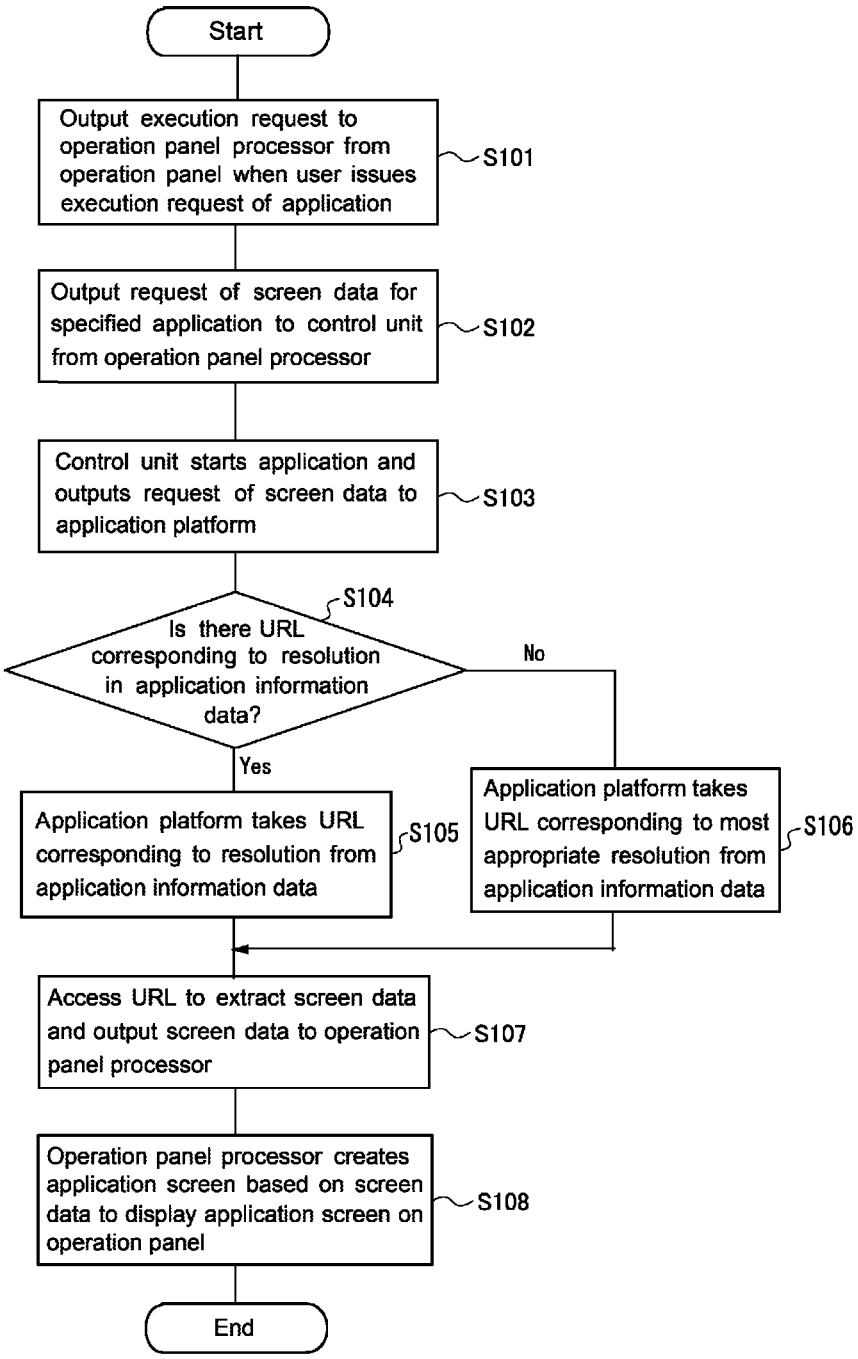
Start
Output execution request to operation panel processor from operation panel when user issues execution request of application
S101
Output request of screen data for specified application to control unit from operation panel processor
S102
Control unit starts application and outputs request of screen data to application platform
S103
S104
Is there URL corresponding to resolution in application information data?
No
Yes
Application platform takes URL corresponding to resolution from application information data
S105
Application platform takes URL corresponding to most appropriate resolution from application information data
S106
Access URL to extract screen data and output screen data to operation panel processor
S107
Operation panel processor creates application screen based on screen data to display application screen on operation panel
S108
End

FIG. 4

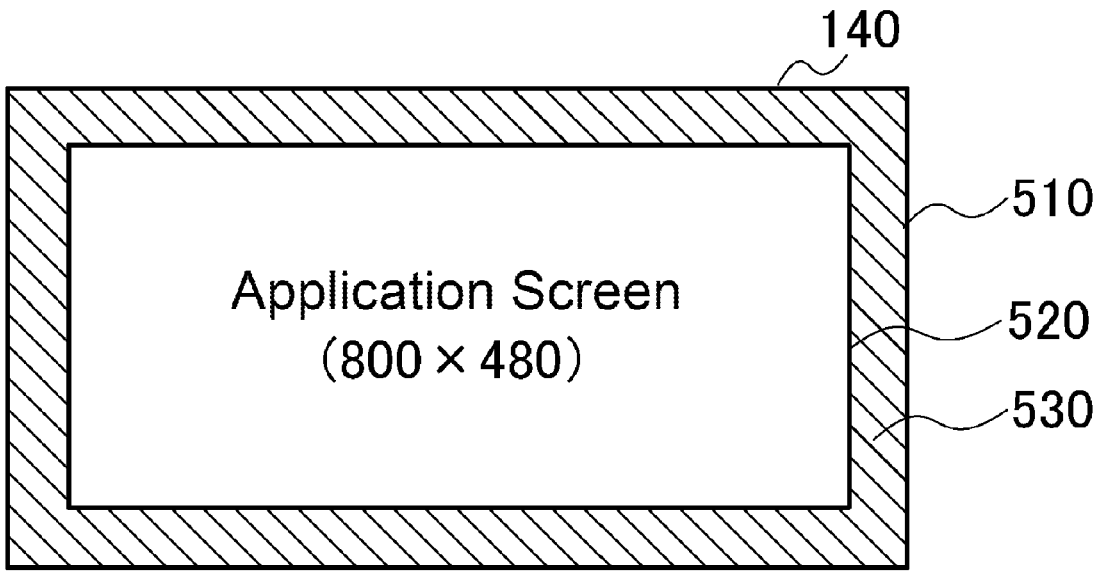

IMAGE FORMING APPARATUS AND METHOD FOR DISPLAYING APPLICATION SCREEN OF IMAGE FORMING APPARATUS THAT ENSURES DISPLAY OF APPLICATION SCREEN ON OPERATION PANEL WITH DIFFERENT RESOLUTION

INCORPORATION BY REFERENCE

This application is based upon, and claims the benefit of priority from, corresponding Japanese Patent Application No. 2014-035100 filed in the Japan Patent Office on Feb. 26, 2014, the entire contents of which are incorporated herein by reference.

BACKGROUND

Unless otherwise indicated herein, the description in this section is not prior art to the claims in this application and is not admitted to be prior art by inclusion in this section.

According to the latest technology, a typical image forming apparatus, which is a printer, a multifunction peripheral (MFP), or similar apparatus, ensures simplify installing an additional application convenient for a user. To execute the identical application on image forming apparatuses having operation panels with different resolutions, a known image forming apparatus causes an application to determine the resolution of the operation panel so as to switch screen data for displaying an application screen corresponding to the resolution. However, in the known image forming apparatus, every time a new image forming apparatus with a different resolution is released, it is necessary to revise the logic of the application so as to execute the application using the operation panel of the new image forming apparatus.

SUMMARY

An image forming apparatus, into which applications are installable, according to an aspect of the disclosure includes an operation panel and a resolution comparing circuit. The operation panel has a display resolution. The resolution comparing circuit compares the display resolution with resolution of an application screen that an installed application displays. If the resolution comparing circuit determines that the display resolution is higher than the application screen resolution, the image forming apparatus displays the application screen as a screen provided with a frame.

An image forming apparatus according to another aspect of the disclosure, into which applications are installable, includes an application-information data configuring circuit and an application-screen display circuit. The application-information data configuring circuit configures application information data with a plurality of resolutions for an installed application screen to be displayed by the image forming apparatus. The application-screen display circuit switches into any one of the plurality of resolutions with which the application information data is configured, to display the application screen. In instances of displaying the application screen on an operation panel, of the image forming apparatus, of higher resolution than any one of the plurality of resolutions with which the application information data is configured, the image forming apparatus displays the application screen as a screen provided with a frame.

These as well as other aspects, advantages, and alternatives will become apparent to those of ordinary skill in the art by reading the following detailed description with reference where appropriate to the accompanying drawings. Further, it should be understood that the description provided in this summary section and elsewhere in this document is intended to illustrate the claimed subject matter by way of example and not by way of limitation.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a diagram illustrating a functional block configuration of an image forming apparatus according to one embodiment of the disclosure.

FIG. **2** is a diagram describing a display function of an application screen in the image forming apparatus according to the one embodiment.

FIG. **3** is a flowchart illustrating a display procedure of the application screen in the image forming apparatus according to the one embodiment.

FIG. **4** is a diagram illustrating a display example of the application screen in the image forming apparatus according to the one embodiment.

DETAILED DESCRIPTION

Example apparatuses are described herein. Other example embodiments or features may further be utilized, and other changes may be made, without departing from the spirit or scope of the subject matter presented herein. In the following detailed description, reference is made to the accompanying drawings, which form a part thereof.

The example embodiments described herein are not meant to be limiting. It will be readily understood that the aspects of the present disclosure, as generally described herein, and illustrated in the drawings, can be arranged, substituted, combined, separated, and designed in a wide variety of different configurations, all of which are explicitly contemplated herein.

Hereinafter, a description will be given of an embodiment of the disclosure with reference to the accompanying drawings. According to the disclosure, in an image forming apparatus having an operation panel with a high resolution different from a previous resolution, a previous application displays an application screen on the operation panel of the image forming apparatus corresponding to the high resolution without changing the logic of the application when the previous application does not support an operation panel with this high resolution.

A description will be given of the functional configuration of an image forming apparatus **100** in the embodiment with reference to FIG. **1**. The image forming apparatus **100** illustrated in FIG. **1** includes a control unit **110**, an auxiliary storage unit **120**, a storage unit **130**, an operation panel **140**, an operation panel processor **150**, a document reading unit **160**, an image forming unit **170**, a network communication unit **180**, and an image printing unit **190**. These respective units are connected via a bus or a similar system. The control unit **110** includes an application-execution processor **110***a* as an application-execution circuit. The auxiliary storage unit **120** includes an application storage area **120***a*.

The control unit **110** is a control circuit that includes: a main storage unit such as a RAM and a ROM, and a control unit such as a micro processing unit (MPU) and a central processing unit (CPU). The control unit **110** has a controller function related to interfaces such as various I/Os, a universal serial bus (USB), a bus, and other hardware, and controls the entire image forming apparatus **100**. When a user specifies the application installed on the image forming apparatus **100**

from the operation panel **140** so as to issue an execution request, the application-execution processor **110***a* executes the specified application.

The auxiliary storage unit **120** is an auxiliary storage device that includes a flash memory and a similar storage, and stores the program and the data of the process executed by the control unit **110**. The application storage area **120***a* saves the program and the data of an additionally installed application other than the program provided by the image forming apparatus **100**.

The storage unit **130** is a storage device that includes a hard disk drive, and stores the program and the data of the process executed by the control unit **110**. An image-data storage area **130***a* temporarily saves image data output from the image forming unit **170**, image data received by the network communication unit **180**, and similar data.

The operation panel **140** includes: a main storage unit such as a RAM and a ROM, and a control unit such as an MPU and a CPU. The operation panel **140** accepts a display of an operation screen and an operation by the user. The user can specify the application from the operation panel **140** so as to issue an execution request.

The operation panel processor **150** performs: a process that displays the operation item selected by the user on the operation panel **140**, and a process that receives an input of the operation of the user from the operation panel **140**.

The document reading unit **160** is a document reading device that reads a document set on a platen of the image forming apparatus **100**. When the user issues a request for reading the document from the operation panel **140**, the document reading unit **160** reads the document.

The image forming unit **170** includes an image forming circuit that converts the document read by the document reading unit **160** into image data of a printable image or an image sendable by FAX or email.

The network communication unit **180** is a network communication circuit that includes a removably attachable LAN interface for connecting to a network **300**. The image forming apparatus **100** can communicate with a device such as a personal computer (PC) **200** connected to the network **300** by the network communication unit **180**.

The image printing unit **190** is an image printing device that prints the image data, which is requested to be printed from the user, on a paper sheet.

Next, a description will be given of a display function of the application screen of the image forming apparatus **100** in the embodiment of the disclosure with reference to FIG. **2**. The display function of the application screen is constituted of the operation panel **140**, the operation panel processor **150**, and the control unit **110**. The following describes the processes of the operation panel **140**, the operation panel processor **150**, and the control unit **110** in the display function of the application screen.

The operation panel **140** receives an input of the execution request of an application **111** installed on the image forming apparatus **100** and displays the application screen of the application **111**. The operation panel processor **150** performs: a process that receives an input of the execution request of the application from the operation panel **140** to output the execution request to the control unit **110**; a process that displays the application screen on the operation panel **140**; and a process that receives an input of an operation from the application screen. The control unit **110** takes the application **111**, which is specified by the user, from the application storage area **120***a* of the auxiliary storage unit **120** using the application-execution processor **110***a*. The control unit **110** includes an application platform **112**. The control unit **110** may operate as a screen-data Uniform Resource Locator configuring using the application platform **112**. The operation panel processor **150** may operates as an application-information data configuring circuit and an application-screen display circuit.

The application platform **112** supports the environment where the application **111** is executable, and holds information related to hardware of the image forming apparatus **100**, for example, the resolution and the size of the operation panel **140**. The application platform **112** includes application information data **112***a*. In the application information data **112***a*, unique information related to the application **111** is set.

The unique information related to the application **111** is information such as the name of the application **111**, the area where the application **111** taken by the application-execution processor **110***a* is located, the uniform resource locator (URL) on the Internet indicative of the location of screen data. The URL indicative of the set location of the screen data is divided as follows corresponding to the resolution of the operation panel **140**. For example, when the resolution of the operation panel **140** included in the image forming apparatus **100** is "800×480," the screen data saved at "/application/default_top_screen.jsp" is taken corresponding to "URL_800×480."

URL_800×480=/application/default_top_screen.jsp

URL_480×272=/application/480×272_top_screen.jsp

Next, a description will be given of a display procedure of the application screen in the display function of the application screen illustrated in FIG. **2** in the order corresponding to steps of a flowchart illustrated in FIG. **3**.

Step S**101**

Firstly, when the user specifies the application **111** from the operation panel **140** so as to issue an execution request, the operation panel **140** outputs the execution request of the specified application **111** to the operation panel processor **150**.

Step S**102**

Subsequently, when the operation panel processor **150** receives an input of the execution request of the application **111**, the operation panel processor **150** outputs a request of the screen data for the application **111** specified at step S**101** to the control unit **110** as illustrated in (**1**) of FIG. **2**.

Step S**103**

Subsequently, the control unit **110** starts the application **111** and outputs the request of the screen data of the application **111** specified at step S**101** to the application platform **112**. As just described, starting the application **111** causes operation of the application platform **112**.

Step S**104**

Subsequently, the application platform **112** determines whether the URL corresponding to the held resolution of the operation panel **140** is present in the application information data **112***a*. When the URL corresponding to the resolution is present in the application information data **112***a* (Yes at step S**104**), the process proceeds to step S**105**. When the URL corresponding to the resolution is not present in the application information data **112***a* (No at step S**104**), the process proceeds to S**106**.

Step S**105**

When Yes is determined at step S**104**, the application platform **112** takes the URL corresponding to the resolution of the operation panel **140** from the application information data **112***a*. For example, when the image forming apparatus **100** includes the operation panel **140** with a resolution of 800×480, the application platform **112** takes the URL corresponding to the resolution of 800×480 from the application information data **112***a*.

Step S106

When No is determined at step S104, the application platform 112 takes the URL corresponding to the most appropriate resolution for the resolution of the operation panel 140 from the application information data 112*a*. For example, the image forming apparatus 100 includes the operation panel 140 with a resolution of 1024×768, and the URL corresponding to the resolution of 1024×768 is not present in the application information data 112*a*. Then, the application platform 112 takes the URL corresponding to the most appropriate resolution of 800×480 from the application information data 112*a*.

Step S107

Subsequently, the application platform 112 accesses the URL taken at step S105 or step S106 so as to extract the screen data. Then, the application platform 112 outputs the screen data to the operation panel processor 150 as illustrated in (2) of FIG. 2.

Step S108

Subsequently, when the operation panel processor 150 receives an input of the screen data, the operation panel processor 150 creates the application screen of the application 111 based on the screen data and outputs the application screen to the operation panel 140. At this time, when the screen data corresponding to the most appropriate resolution is taken from the application information data 112*a* since the screen data corresponding to the resolution of the operation panel 140 is not present, the application screen with a frame at its outline is displayed. For example, when the screen data corresponding to the most appropriate resolution of 800×480 is taken since the screen data corresponding to the resolution of 1024×768 is not present in the application information data 112*a*, as illustrated in FIG. 4, a previous application screen 520 with a resolution of 800×480 is displayed and a frame 530 is displayed on the outer side of the application screen 520 within a screen displaying region 510 with a high resolution of 1024×768.

As described above, in the embodiment, the image forming apparatus having the operation panel with a high resolution different from a previous resolution causes simply displaying a previous application screen on the operation panel with the high resolution even when it is too late for changing the application, which is required for displaying the previous application screen. Accordingly, an application developer needs not change the application each time an update to an operation panel with a high resolution is made, and can change the application at once when an update to a plurality of operation panels with high resolutions is made. This ensures reduction in burden on the application developer.

Here, in the embodiment, the description has been given of the application 111 that can switch the screen data for displaying the application screen corresponding to the resolution of the operation panel 140. However, this should not be construed in a limiting sense. For example, the disclosure is also applicable to the application 111 that cannot switch the screen data for displaying the application screen corresponding to the resolution of the operation panel 140. For example, when the operation panel processor 150 compares the resolution of the operation panel 140 and the resolution of the application screen and then these resolutions are the identical, the application screen is directly displayed on the operation panel 140. When the resolution of the operation panel 140 is higher than the resolution of the application screen, the application screen with the frame at its outline is displayed. This ensures a display of the application screen corresponding to the resolution of the operation panel 140. In this example, the operation panel processor 150 may operates as a resolution comparing circuit.

In the embodiment the description has been given of the procedure where the user specifies the application 111 installed on the image forming apparatus 100 from the operation panel 140 so as to display the application screen on the operation panel 140. However, this should not be construed in a limiting sense. For example, it is possible to specify the application 111 installed on the image forming apparatus 100 from the PC 200 so as to display the application screen on the operation panel of the PC 200. In this case, information such as the resolution and the size of the operation panel of the PC 200 is preliminarily stored in the auxiliary storage unit 120 of the image forming apparatus 100.

With these image forming apparatus and method for displaying the application screen of the image forming apparatus according to the disclosure, a previous application screen can be displayed on an operation panel with a high resolution even when it is impossible to immediately create the screen data and change the logic of the application. This ensures reduction in work of the application developer.

The disclosure is appropriate for a device such as an image forming apparatus where an application is installable and that has a screen display function. The disclosure is not limited to the device, and is applicable to a system where an application is installable and that has a screen display function.

While various aspects and embodiments have been disclosed herein, other aspects and embodiments will be apparent to those skilled in the art. The various aspects and embodiments disclosed herein are for purposes of illustration and are not intended to be limiting, with the true scope and spirit being indicated by the following claims.

What is claimed is:

1. An image forming apparatus into which applications are installable, the image forming apparatus comprising:
   - an operation panel having a display resolution;
   - a resolution comparing circuit that compares the display resolution with resolution of an application screen that an installed application displays; wherein
   - if the resolution comparing circuit determines that the display resolution is higher than the application screen resolution, the image forming apparatus displays the application screen as a screen provided with a frame.

2. An image forming apparatus into which applications are installable, the image forming apparatus comprising:
   - an application-information data configuring circuit that configures application information data with a plurality of resolutions for an installed application screen to be displayed by the image forming apparatus; and
   - an application-screen display circuit that switches into any one of the plurality of resolutions with which the application information data is configured, to display the application screen; wherein
   - in instances of displaying the application screen on an operation panel, of the image forming apparatus, of higher resolution than any one of the plurality of resolutions with which the application information data is configured, the image forming apparatus displays the application screen as a screen provided with a frame.

3. The image forming apparatus according to claim 2, further comprising:
   - a screen-data uniform resource locator, URL, configuring circuit that configures the application information data with a URL where screen data for the application screen is saved.

4. The image forming apparatus according to claim 1, wherein the image forming apparatus displays the application screen on the operation panel of the image forming apparatus, or on the operation panel of a personal computer connected to a network.

5. A method for displaying an application screen using the image forming apparatus according to claim 1, the method comprising:

comparing the display resolution with resolution of the application screen that the installed application displays; and

displaying the application screen as the screen provided with the frame if the comparing of resolutions determines that the display resolution is higher than the application screen resolution.

6. A method for displaying an application screen using the image forming apparatus according to claim 2, the method comprising:

configuring the application information data with the plurality of resolutions for the installed application screen to be displayed by the image forming apparatus;

switching into any one of the plurality of resolutions with which the application information data is configured, to display the application screen; and

displaying the application screen as the screen provided with the frame, in instances of displaying the application screen on the operation panel, of the image forming apparatus, of higher resolution than any one of the plurality of resolutions with which the application information data is configured.

* * * * *